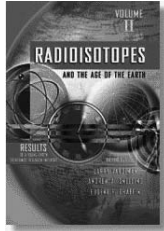


Assessing the RATE Project

Randy Isaac



Larry Vardiman, Andrew A. Snelling, and Eugene F. Chaffin, ed., *Radioisotopes and the Age of the Earth, vol. II* (Waco, TX: Institute for Creation Research, 2005). 818 pages, index. Hardcover; \$79.99. ISBN: 0932766811.



In 1997, the Institute of Creation Research (ICR) and the Creation Research Society initiated an eight-year research program to investigate the validity of radioisotope dating of rocks. The project was named RATE for Radioisotopes and the Age of The Earth. Preliminary investigations carried out in the first three years were summarized in volume I of this work, published in 2000. Volume II, published in 2005, represents the final report. At \$79.99, 818 pages, and 3.5 pounds, the book is a heavy investment. For most interested parties, the final five pages of text, pp. 765–9, are sufficient to grasp the essence of the book. A nontechnical version of this book, authored by Donald DeYoung, and a video documentary have also been prepared. Both are titled *Thousands Not Billions: Challenging an Icon of Evolution*.

The first chapter is an introduction and provides an overview of the RATE program. Funding was provided by the ICR (\$250,000) and by more than one million dollars of donations. This chapter also provides guidance for carrying out creation science research. An appendix to this chapter, written by Henry Morris Jr., defines guidelines for peer review. Criteria for selecting reviewers include, whenever possible, those who are in agreement with the biblical viewpoint of the researcher. Though the RATE project has formally ended, a research council has been established to pursue a broader inter-disciplinary program in the future.

Chapters 2 through 8 present the technical work of the RATE project. Chapter 9 covers a statistical determination of genre in biblical Hebrew to substantiate the young-earth interpretation of Genesis. Chapter 10 summarizes the project with conclusions and recommendations.

The key points of the book can be summarized as follows:

1. There is overwhelming evidence of more than 500 million years worth of radioactive decay.
2. Biblical interpretation and some scientific studies indicate a young earth.
3. Therefore, radioactive decay must have been accelerated by approximately a factor of one billion during the first three days of creation and during the Flood.
4. The concept of accelerated decay leads to two unresolved scientific problems, the heat problem and the radiation problem, though there is confidence that these will be solved in the future.
5. Therefore, the RATE project provides encouragement regarding the reliability of the Bible.

That there is overwhelming evidence for massive radioactive decay in the past is substantiated by an analysis of fission tracks in zircons and by repeated measurements of the usual radioisotopic dating methods. The data presented are not controversial and represent a small fraction of the data available. The RATE researchers concede that there is evidence for “more than 500 million years worth (at today’s rates) of nuclear and radioisotope decay” (p. 284). This is a key departure from previous creationist claims

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Essay Review

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that radioactive decay is much less than reported.

The claim that the earth is approximately 6,000 years old is supported from biblical interpretation and from four areas of scientific studies: helium diffusion in zircons, radiohalos in granites, isochron discordances, and the presence of trace amounts of carbon-14 (C-14) in pre-Cambrian material. An entire chapter is devoted to presenting the technical data in each of these four topics.

The authors argue that by extrapolating data on the rate of helium diffusion in minerals, the high concentration of helium in zircons can only be explained by a young earth. However, the data presented were taken in conditions of laboratory vacuum and actual diffusion rates in field conditions are known to be considerably lower, by as much as a factor of one thousand or more. The RATE researchers claim to have meticulously accounted for all crystallographic features. However, the diffusion rate of noble gases in minerals is so complex both theoretically and experimentally that helium concentrations are not considered by geochronologists to be reliable for any dating implications.

The chapter on radiohalos presents details of halos found in granites. These darkened spherical areas in minerals are due to damage induced by alpha particles from radioactive decay products of uranium and thorium, most notably from polonium. Since polonium has a short half-life and granite is thought to be formed by a long period of cooling, such damage should have been annealed by the time the granite hardened. Therefore the authors argue that the granite must be much younger and have cooled rapidly. From the relative abundances of uranium and polonium halos, they deduce that the granites must have formed during the Flood and that there must have been highly accelerated decay rates. They acknowledge the unresolved dilemma of extraordinary heat production from such high decay rates with their assertion of a rapid cooling rate to form the granite. What they did not recognize is that the presence of uranium also seems to provide a reasonable explanation for the source of the polonium and polonium halos with normal decay rates and standard ages of granite.

In the chapter on isochron discordances, the authors present a large amount of data that date rocks in the range of hundreds of millions of years. The isochron method relies on selecting minerals from different regions of a particular rock formation. The different minerals are all the same age since they come from the same rock but likely have different concentrations of radioactive material due to non-uniform environmental interactions. By plotting the isotope concentrations of all these minerals, geochronologists can obtain an age of the rock. The accuracy of the age can often be improved by using several different radioisotopes. Here the authors painstakingly show cases where different minerals and different radioisotopes lead to ages that differ by as much as 10–15% after allowing for maximum error bars. Without an obvious explanation for these discordances, the authors claim that standard radioisotope dating techniques are fundamentally flawed. Yet they fail to explain why there are so many cases where there is good concordance of isochrons, something which would never happen if radioisotopic dating were not valid. Discordances are not at all unusual and the source of discordance is not always understood but these fail to invalidate the vast amount of concordance. Furthermore, no argument is presented why differences of 15% would justify the claim that radioisotope dating is in error by a factor of one million or more.

Based on the detection of trace amounts of C-14 in rocks such as diamond that have been dated as hundreds of millions of years old, the authors argue for a young earth. Accelerator mass spectroscopy is a technique that can detect very low concentrations of C-14 which has a half-life of 5,730 years. The argument is that after 100,000 years there should be no C-14 left in a sample which has not been exposed to external sources of carbon. Therefore the presence of approximately one tenth of one percent of C-14 as a percentage of the total carbon indicates an age for these rocks of approximately 50,000 years.

The difficulty, however, is in assuring there is and never has been another source of C-14 for that sample since it was originally formed from organic material. It is known that there are many subtle sources of C-14 such as contamination, microbial

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action, and some nuclear interactions. For example, neutrons from uranium decay can produce C-14 from nitrogen impurities. The authors declare that since they used extraordinary care in handling the samples and are studying diamond, no extraneous source is possible. However, it is virtually impossible to eliminate such sources and chronologists discount the reliability of C-14 dating if the concentration is below approximately 0.5 percent.

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The authors also acknowledge that if the C-14 dating on these samples were valid, there would still be a problem because the rocks are ten times older than expected from some biblical interpretations. To achieve the desired age of 5,000 years, it must be postulated that the relative concentration of C-14 to total carbon in the atmosphere was 500 times lower before the Flood than it is today. John Baumgardner rationalizes that the total amount of carbon in the biosphere must have been "300-700 times the total C relative to our present world" on the basis of the vast amount of carboniferous material in the earth. Assuming that the total amount of C-14 was approximately the same as today, the ratio of C-14 to total C would have been 1/500 of today's value, bringing the age of the rocks to the preferred value of 5,000 years. The isotopic ratio might have increased dramatically during the Flood because "accelerated nuclear decay during the Flood would have converted substantial amounts of crustal N to C-14" (p. 619). This circular reasoning and the lack of credibility of interpreting traces of C-14 for dating purposes make it evident that C-14 does not provide evidence for a young earth.

The technical evidence in support of the argument for a young earth is therefore not based on any accepted scientific methodology. All of the four radioisotopic areas discussed involve aspects which the scientific community feels are not reliable for dating. Only one of the four areas discussed, helium diffusion in zircons, is claimed to yield

a measurement of the age of the earth on the order of 6,000 years. This is merely a fitting parameter in a complex system of many unknown parameters. The other three areas all lead to ages much older than 6,000 years. The authors claim that the results cast doubt on standard dating techniques, making the young-earth scenario more credible.

There is no direct evidence provided for accelerated decay. It is inferred solely from combining the evidence for massive decay with the young-earth position. As noted above, the evidence given in this book for a young earth is not based on any reliable techniques and so the argument for accelerated decay crumbles. Nevertheless, the authors explore theoretically how such an increase in the decay rates might have occurred. Through an analysis of nuclear forces, they indicate that only a small change in the strength of the coupling constant that characterizes the so-called strong force between nucleons would lead to a change in decay constants of many orders of magnitude.

While this may be correct mathematically, the authors fail to explain how such a fundamental constant of particle physics could change even a tiny amount. Experimental data and theoretical considerations have shown the strong coupling constant to be indeed a constant. Furthermore, to explain their results, the authors must speculate that this coupling constant took a different value in at least two time periods in the past: the first three days of creation week and the year of the Flood. At other times, it was the same as today. A further complication is the need to postulate that some nuclei were affected but not others. They state that C-14 did not have an accelerated decay constant while heavier nuclei did. As a result, not only have the authors failed to make a case for accelerated decay, they must assert an extraordinary variation of the strong coupling constant as a function of time and of nuclear weight to force-fit the data.

The authors report that faced with this evidence, a young-earth advocate must address at least two key scientific problems resulting from a one-year period of accelerated decay rates during the Flood. The first is the heat problem. Thermal energy from radioactive processes is a major source of heat in the earth. If those processes were accelerated by many orders of magnitude, the earth would have quickly evaporated from the heat had there not been an extraordinary mechanism of cooling. The authors state:

The removal of heat was so rapid that it likely involved a process other than conduction, convection, or radiation ... We believe it may be possible to discover how [God] did it (p. 763).

Future research is suggested along the lines of Russell Humphrey's idea of volumetric cooling based on relativistic principles even though this known phenomenon, the basis for red-shifting of starlight, does not apply to bound



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particles such as the earth. It is acknowledged that this approach, even if it were valid, has the difficulty of being uniform rather than selective as would be needed to cool only radioactive material and not, for example, the oceans. In other words, the authors acknowledge that accelerated decay requires a most unusual heat removal mechanism that is outside the known laws of thermodynamics. The second unresolved problem cited in the book is the radiation problem. How did Noah and his passengers survive a year in which radioactivity was one million times greater than it is today? No known solution exists, they state. Nevertheless, "The RATE group is confident that these issues will be solved ..."

The leap to the conclusion is never made clear. Confidence in a future resolution of extraordinary scientific contradiction moves smoothly to a message "to Christians in general to encourage them regarding the reliability of the Bible" (p. 768). In other words, the expectation of a future solution to a major scientific impasse is being translated into conferences, books, and videos proclaiming the good news that the RATE project has demonstrated the scientific validity of a young earth.

The conclusions of the RATE project are being billed as "groundbreaking results." This is a fairly accurate description since a group of creation scientists acknowledge that hundreds of millions of years worth of radioactivity have occurred. They attempt to explain how this massive radioactivity could have occurred in a few thousand years but admit that consistent solutions have not yet been found. The vast majority of the book is devoted to providing technical details that the authors believe prove that the earth is young and that radioisotope decay has not always been constant. All of these areas of investigation have been addressed elsewhere by the scientific community and have been shown to be without merit. The only new data provided in this book are in the category of additional details and there are no significantly new claims.

In this book, the authors admit that a young-earth position cannot be reconciled with the scientific data without assuming that exotic solutions will be discovered in the future. No known thermodynamic pro-

cess could account for the required rate of heat removal nor is there any known way to protect organisms from radiation damage. The young-earth advocate is therefore left with two positions. Either God created the earth with the appearance of age (thought by many to be inconsistent with the character of God) or else there are radical scientific laws yet to be discovered that would revolutionize science in the future. The authors acknowledge that no current scientific understanding is consistent with a young earth. Yet they are so confident that these problems will be resolved that they encourage a message that the reliability of the Bible has been confirmed.

In *Thousands Not Billions*, the incompatibility of the young-earth position with current scientific understanding is glossed over in the final four pages of the book. The thermodynamic dilemma is dismissed with

Possible mechanisms have been explored that could safeguard the earth from severe overheating during accelerated decay events. One of these involves cosmological or volume cooling, the result of a rapid expansion of space. Many details remain to be filled in for this and other proposed processes of heat removal (p. 180).

Unfortunately for young-earth advocates, cosmological expansion does not cool material on earth nor does it cool some materials and not others. Yet DeYoung concludes: "Young-earth creation is neither outdated nor in opposition to science" (p. 182).

The ASA does not take a position on issues when there is honest disagreement among Christians provided there is adherence to our statement of faith and to integrity in science. Accordingly, the ASA neither endorses nor opposes young-earth creationism which recognizes the possibility of a recent creation with appearance of age or which acknowledges the unresolved discrepancy between scientific data and a young-earth position. However, claims that scientific data affirm a young earth do not meet the criterion of integrity in science. Any portrayal of the RATE project as confirming scientific support for a young earth, contradicts the RATE project's own admission of unresolved problems. The ASA can and does oppose such deception. ♦